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POLLEN MORPHOLOGY OF
PILLANSIA L. BOLUS
(IRIDACEAE)¹

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ABSTRACT

The monotypic southwestern Cape genus Pillansia is a taxonomically isolated member of Iridaceae subfamily Ixioideae. It shares some synapomorphies with Ixioideae, although it differs in its unspecialized leaf anatomy and inflorescence structure, a panicle rather than a spike. The pollen is typical of Ixioideae in having a micropunctate exine with minute supratectal papillae. Exine of most other genera and subfamilies of Iridaceae is reticulate. Membership of Pillansia in Ixioideae is thus supported by pollen morphology. Micropunctate exine must be regarded as the basic condition for the subfamily and an additional feature separating Ixioideae from other Iridaceae.

Pillansia L. Bolus is a monotypic genus of Iridaceae–Ixioideae, the largest of the four subfamilies currently recognized. It is a relatively rare, narrow endemic of the southwestern Cape, South Africa (Goldblatt, 1977) and is restricted to rocky sandstone sites in the Caledon district. It has a basic chromosome number of $x = 20$ and thus appears to be paleopolyploid. Most other genera of Ixioideae have base numbers in the $x = 11$ –9 range or are neopolyploid with $n = 16$ –13. Although *Pillansia* diverges in some impor-

tant respects from other members of the subfamily, it is widely accepted as belonging to Ixioideae. Nevertheless, it is taxonomically isolated and appears to have no identifiable close relatives. It accords with Ixioideae in several specialized features (synapomorphies) (Goldblatt, in prep.) that characterize the subfamily. These include a long-lasting perianth; sessile flowers subtended by a pair of opposed bracts; a well-developed, though short, perianth tube; and a basal rooting corm.

The pollen morphology of *Pillansia* has

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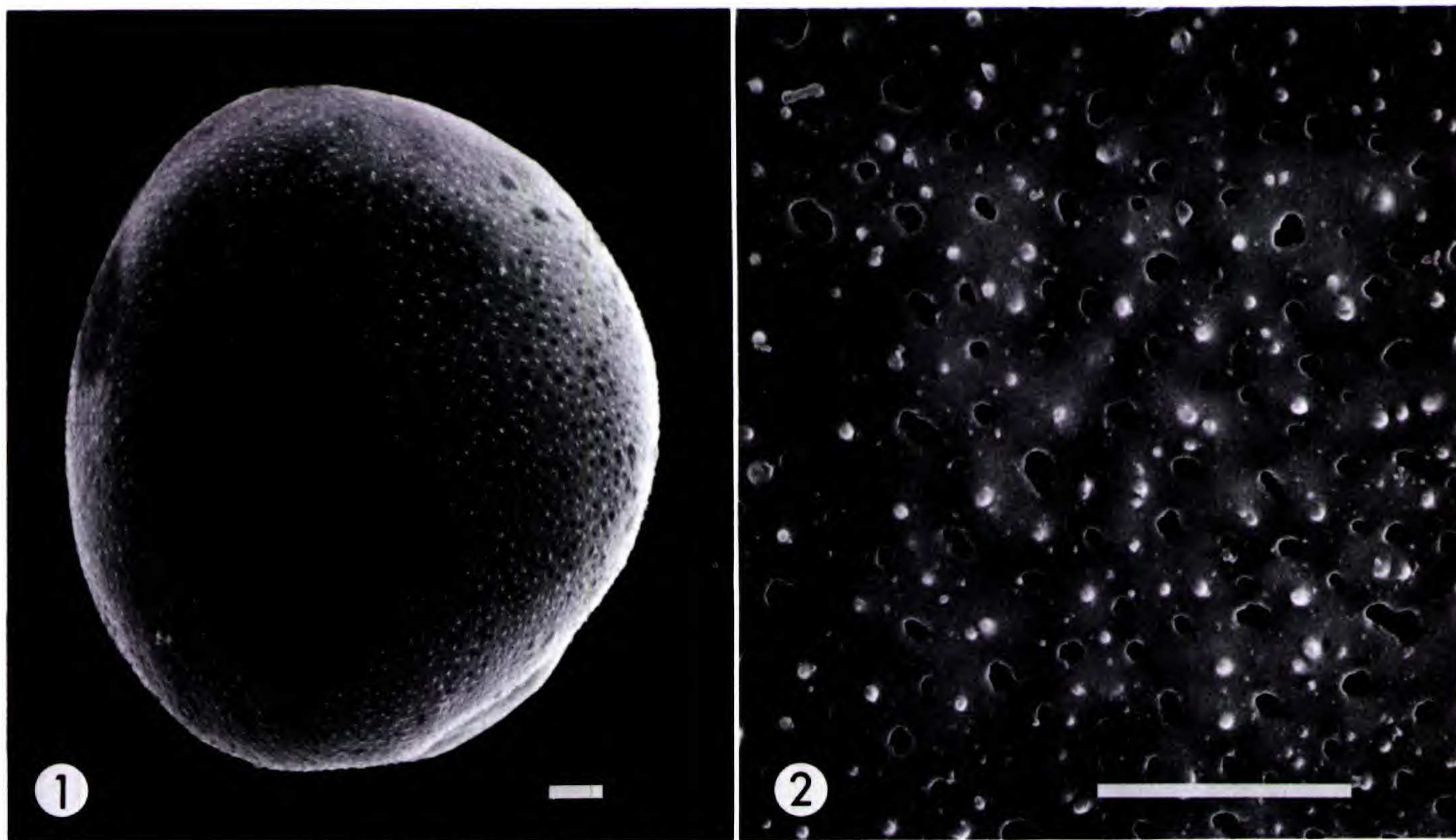


FIGURE 1, 2. Scanning electron micrographs of *Pillansia templemanii*.—1. Whole grain in equatorial view $\times 1,200$.—2. Detail of the exine surface $\times 6,000$. Scale bars = $5\ \mu\text{m}$.

until now been unknown, and it is important to establish whether it has the basic reticulate (to retipilate) exine of most Iridaceae (Schulze, 1971) or the specialized micropunctate and micropapillate exine characteristic of Ixioideae (Schulze, 1970, 1971).

METHODS

Pollen of *Pillansia templemanii* (Baker) L. Bolus was extracted from flowers from herbarium specimens (voucher: *Bolus s.n.*, MO 2080184) and subjected to standard acetolysis treatment (Erdtman, 1960). Acetolyzed pollen was mounted on aluminum stubs, gold coated, and viewed in a Hitachi S-450 scanning electron microscope.

OBSERVATIONS

Pollen of *Pillansia* is $65\text{--}75\ \mu\text{m}$ long (polar axis as measured from scanning electron micrographs), ellipsoid to widely ellipsoid (Fig. 1), and monosulcate with the sulcus running the length of the grain. The exine is densely micropunctate (punctitegillate of some authors) and micropapillate (Fig. 2). The pores in the tectum are round to irregular in shape

and $0.15\text{--}1\ \mu\text{m}$ in diameter. There are ca. 50 pores/ $100\ \mu\text{m}^2$. The papillae are small, mostly rounded excrescences, and up to $0.4\ \mu\text{m}$ in diameter and height. They are scattered fairly regularly with a density of ca. 52/ $100\ \mu\text{m}^2$ between the pores.

DISCUSSION

Pillansia differs from all other Ixioideae in its paniculate inflorescence and leaves lacking a distinct central vein or central cluster of veins, both unspecialized conditions. Other Ixioideae have a spicate inflorescence or one believed to be derived from a spike (flowers solitary on branches or flowers sessile in a corymbose panicle) and have distinct (or more or less distinct) central veins. *Pillansia* differs further from other Ixioideae in leaf anatomy (P. Rudall, pers. comm.) by having isodiametric to longitudinally elongated mesophyll cells and epidermal cells with nearly straight walls and one or no papillae. Other Ixioideae have transversely elongated mesophyll cells and epidermal cells with sinuous walls and two or more papillae.

The pollen of *Pillansia* clearly matches that of other Ixioideae, which lends further

support for its retention in that subfamily. In a survey of pollen morphology in 21 of the 45 genera of Ixioideae, Schulze (1970, 1971) found that 20 have micropunctate exines. Only *Micranthus* is reported to deviate, having the retipilate exine characteristic of the other subfamilies. Schulze's observations have been confirmed by SEM studies by de Vos (1974a, b, 1982) for *Syringodea*, *Duthieastrum*, and *Tritonia*, and by Straka & Friedrich (1984) for a Malagasy species of *Gladiolus* (as *Geissorhiza*). Pollen morphology provides no additional evidence for the relationships of *Pillansia* within Ixioideae—it remains a puzzling isolated and apparently relictual genus. Its unusual combination of features suggests that it may represent a link between Ixioideae and the remaining Iridaceae and could, in fact, be very close to the ancestral type of Ixioideae.

It now seems all but certain that micropunctate exine is basic for Ixioideae, and the presence of retipilate exine in *Micranthus*, an apparently typical member of the subfam-

ily, is surprising, particularly as the closely allied *Thereianthus* is reported to have micropunctate exine. This may represent an example of a reversal to an ancestral condition, but pollen of all three species of *Micranthus* should be critically reexamined.

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